

THE NEW YORKER INTERVIEW

# DICKSON DESPOMMIER WANTS OUR CITIES TO BE LIKE FORESTS

*A leading proponent of vertical farming discusses how urban areas should  
adapt to a perilous environmental future.*

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January 14, 2024



Illustration by Daniele Castellano

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**I**n 2000, Dickson D. Despommier, then a professor of public health and microbiology at Columbia University, was teaching a class on medical

ecology in which he asked his students, “What will the world be like in 2050?,” and a follow-up, “What would you *like* the world to be like in 2050?” As Despommier told *The New Yorker’s* Ian Frazier in 2017, his students “decided that by 2050 the planet will be really crowded, with eight or nine billion people, and they wanted New York City to be able to feed its population entirely on crops grown within its own geographic limit.” The class had calculated that by farming every square foot of rooftop space in the city, you could provide enough calories to feed only about two per cent of the 2050 population of New York.

Urban farming was a good idea, Despommier thought, but his students hadn’t taken it far enough. “What’s wrong with putting the farmer *inside* the building?” he asked them, remembering that at the time there were “hundreds to perhaps thousands” of empty buildings in New York City. Throughout the next decade, as he continued to teach the class, Despommier and his students developed this idea—including the use of cultivation techniques that required little or no soil—culminating in the 2010 book, “The Vertical Farm: Feeding the World in the 21st Century.” The concept proved popular and has been widely implemented. There are now more than two thousand vertical farms in the U.S. alone, with a market value estimated at \$5.6 billion in 2022.

Though retired from full-time teaching, Despommier is still thinking about ecological problems. His latest book, “The New City: How to Build Our Sustainable Urban Future,” which evolved from a course that Despommier taught at Fordham University, is a manifesto for the future of cities on a warming planet. As Despommier notes, the world’s cities make up two per cent of the Earth’s surface but produce sixty per cent of the planet’s greenhouse emissions. And cities are likely to continue growing. It is estimated that, by the middle of this century, sixty-eight per cent of the world’s population will live in urban areas (up from fifty-seven per cent in 2021).

Last summer's seemingly endless wildfires and extreme heat events have made Despommier's ideas seem especially urgent. On a recent morning, I spoke with him over Zoom, where he joined from his apartment in Fort Lee, New Jersey. At eighty-three, he remains a lively, charismatic presence, even onscreen, punctuating his answers with dramatic hand gestures, rhetorical questions, punning asides, and laughter. Our conversation has been condensed and edited for clarity.

**Vertical farms and other forms of urban agriculture are one of the pillars of this vision you're putting forward for transforming the way cities are built and managed. Another pillar is the idea that cities should be constructed from wood. It seems counterintuitive to build a city out of wood when we have a deforestation problem. Why is it important to build cities out of wood?**

Trees sequester carbon, harvest water, produce food, and convert sunlight into energy. Those are the four characteristics I would love a city to have. The resiliency of forests is to be emulated. And that's the reason why I picked forests as my biomimic. I want my city to be as resilient as Earth's hardwood forests.

The main reason why deforestation is occurring is to make room for farms. Before there was farming, which was about ten to twelve thousand years ago, we had six trillion trees. We now have three trillion trees. We've cut down half of the Earth's ability to capture carbon. We're not going to replace all of that with new trees. But if we got back up to five trillion trees, let's say, simply by leaving the remaining forests alone and letting them repopulate and selectively harvesting, the Earth's temperature rise would begin to slow down. And, once you've slowed it down, that gives you time to reflect and to prepare for these changes that are not going to go away. Replacing three trillion trees by planting them—that's not going to work. We'll never be able to do that. So we have to let nature do that part. And, in order to do that, we have to return a lot of farmland back to what it used to be, which was forests.

[A scientist] named Gene Likens studied what happens to a forest when you cut it down—all of it. You don't do anything. You leave it all in place and just watch it regrow. He started those experiments in the nineteen-sixties in New Hampshire, a place called Hubbard Brook. Hubbard Brook has been continuously studied since then, for how trees and how a forest recovers from a catastrophic event, like clear-cutting. If you look at what happened when Mt. St. Helens blew, it's almost the same thing. The great majority of the trees got knocked down by the shock wave from the explosion. If you go online and look at Mt. St. Helens today, you wouldn't recognize it. Actually, you would. It looks like the old Mt. St. Helens! So that's only forty years from a catastrophic event back to a harvestable forest.

**There's a history of fires burning down cities such as London and Chicago. And this summer we've seen the devastating Canadian wildfires. Why build out of wood when it is more susceptible to fire and decay than other construction materials?**

Yeah, like concrete and steel, for instance. The concrete and steel industries have huge carbon footprints. It takes a lot of energy to make those things. There's a tremendous release of CO<sub>2</sub> in making concrete, and there's a tremendous CO<sub>2</sub> release by melting iron to make an I-beam. And, once you've made the I-beam, the I-beam is good for only one thing, and that's the building that it was measured for. If you want to use it for something else, you'll probably have to melt it down and throw it into another mold. The point is that you're using a lot of energy this way, right?

Let's go back to the forest. When a forest catches fire, burns, and then the fire goes out, what do you see? Do you see an absolutely levelled plane with nothing on it? Or do you see the remnants of the forest, the trunks of the trees, which are still there? Why is that trunk still standing? That's wood, right? And it didn't burn to the ground. There's a good reason for that. The trunk is made out of very dense-packed lignin and cellulose. Those are the two components of wood. The inner core of a tree is not alive. It's like a coral

reef and the tree grows out from that core. It's so dense that the oxygen can't get to the rest of the lignin and the cellulose. Now what if we could make a wood product that had the same characteristics?

Thank God for an Austrian researcher named Gerhard Schickhofer who, in the nineteen-nineties, began developing a wood product that imitates the remnant of a forest fire. That's called cross-laminated timber (C.L.T.). If you go online and look up cross-laminated timber, your eyes will pop at all of the buildings that are now being made out of it. It's actually stronger than concrete and steel. It's stronger, lighter, easier to manipulate, and to repurpose. You can repurpose this stuff almost instantly. You can just take it down like it was a Lego set.

**You make the point that cities are only going to grow. If so, we're going to need to build more large buildings. Can this kind of wood be adapted for constructing tall buildings?**

In the book, I have a quote from one builder saying that there is no limit to the height of which you can make a cross-laminated-timber building. And the trees that we're talking about here are not greater in diameter than nine inches. That's the ideal size for a tree to turn into a cross-laminated-timber building.

**How long does it take to grow a tree from a seedling to nine inches?**

Twenty years. If you look at New York City in the year 1900, and then look at the year 2023 and do a building-for-building count, how many buildings do you think are present in 2023 that were present in 1900?

**A small number, I bet.**

It's a very small number. It's about twenty per cent. Major metropolitan areas tend to turn over, so to speak. The buildings turn over, as new technology comes online for heating, for electrical, for safety, for transportation. Those

old buildings have to be scrapped, right? There's a hole in the ground. And, next thing you know, there's a brand-new building.

It sounds like we'll be using up all the wood, but the fact is that, if vertical farming succeeds, there'll be a lot more land to grow trees. That's the built-in safety valve that we can take advantage of to have a completely renewable resource of building material that also captures carbon. There's no other material like that. If we value it enough, we will make sure that it's economically feasible to do that. The clear-cut model didn't work, and it actually wrecked other industries, but we can still have a managed forest, though it's managed for biodiversity now. Not only does the tree that you've used for the cross-laminated timber capture carbon but the tree that grows up in place of the tree that you just took out—that's another source of carbon capture. So you've doubled your carbon sink in twenty years, basically.

**The two other pillars of your manifesto for the new city are renewable energy and harvesting water from the air. I think that most people are familiar with the renewable-energy sources that you discuss—such as wind, solar, and geothermal—but perhaps you should talk about your proposals for cities harvesting water from the air.**

Let's take a plane to Bermuda: sixty-three thousand people living in an archipelago in the middle of the Atlantic Ocean, with very little groundwater. They live on a coral atoll. So there's nowhere for the water to collect. They live almost exclusively off of rainwater. How do they do that? They have a roof on every building that, if you look at it from the top, looks like a spiral that finally ends up in one of the corners of the building. A gutter system collects the water; water circulates down into the cistern. That's sixty-three thousand people. And the reward is you don't need a centralized water system.

Now let's take New York City, which, on average, gets forty-seven inches of rain per year. The total square footage of New York's footprint is three

hundred square miles. How much rain a year in gallons do you think forty-seven inches of rain in a three-hundred-square-mile area represents? The city would gain two hundred and seventy-one billion gallons of fresh water if it could harvest every drop of rain that fell on New York. No place, not even Bermuda, harvests every drop of rain. If you get a very heavy rainstorm, those roofs are inefficient in collecting all the water that falls on them. Those roofs would have to be redesigned for urban areas that have the option of taking every rooftop and turning it into a rain-collection device. New York City would never, ever have a water shortage again, no matter what. So that's one source of water that every city with twenty inches of rain or more per year would benefit from.

There are some cities, of course, where it doesn't rain as much as that, so you have to rely on other ways of harvesting water from the air—and one of them is harvesting from fog. They have devices that look like nets, nets on poles. And, if you look closely at the net, it's a collection of water droplets. All of those droplets filter down into a collection device, and eventually you've got big buckets of water. You can supply a whole village like that.

There are some cities in China that could harvest over a trillion gallons of water per year—huge cities like Shanghai, for instance, and Beijing. Those cities have frequent water shortages. What if every building were designed in a way that it could harvest all the water that fell on that building? Foster + Partners, a large architectural firm in London, has already done it.

**What about desert cities like Phoenix? The State of Arizona recently announced that it would limit building permits for new construction that relies on groundwater. How do desert cities harvest water from the air?**

Well, the air, no matter where you go, has got some humidity factor associated with it. Even though the humidity might be low. There's still water in the air that you can harvest if you know how to do it. So no matter where you are, there will always be some water to collect. But the argument

could be made that there isn't enough water—that, even if you did it every day and every building did it, you still might not have enough, O.K.? But they get an annual monsoon in Phoenix, right? Just plan for it. You could design something for a roof that would fold out of sight when you're not using it. And, when you want it, it comes up and forms a tentlike affair. When it rains, all the water collects in the middle and is stored in a cistern. If you value water, you will do that. And if you don't value water then you'll never have enough water to satisfy you.

There is one more major resource of water that we're not talking about, and that is reuse of wastewater. How much water per day does New York City consume from its five main reservoirs in New York State? 1.2 billion gallons of water per day. So, over eight million people; 1.2 billion gallons per day. And then how much water do you think New York City discards per day? Wastewater: more than a billion gallons! And we don't use one drop of that water. If you could recover 1.2 billion gallons of water a day, and you drink 1.2 billion gallons a day, well, that's a zero-sum equation. Why don't we do that?

**We've outlined a number of your proposals. I want to discuss going from proposal to enacting some of these ideas. There's an existing set of government officials and real-estate developers and construction companies that control the construction of new buildings. How are you going to get them to buy into these ideas and start adopting some of these practices?**

Well, if you put the burden of proof on my shoulders only, I think it will fail. Because I'm now eighty-three years old, and I don't think I can spend the rest of my life going around the city councils preaching the gospel. Fortunately, and I mean really fortunately, there are lots of people out there who are already doing that. One of them is William McDonough, an architect and designer who designs buildings made out of cross-laminated timber. Michael Green has a TED talk [[“Why We Should Build Wooden](#)

Skyscrapers”] that’s really worth going to listen to. In his TED talk, he basically says, “I’m a citizen of Earth, just like you are.” He says, “I would like to see this place getting better. And here’s how to make it better.”

This will not happen overnight. We’ve gone through ten thousand years with agriculture as the driving force in modernizing humanity. We’ve invented mathematics and astronomy, language and music and art, and society. It’s going to take another one hundred to two hundred years, I think, before everybody says enough is enough. You know, if ten per cent of my population dies every year from heatstroke, or if they die from starvation, or if they die from water deprivation, or if they die from some disease that’s only transmitted at that particular temperature, like, for instance, malaria, eventually, everybody will say, “Wait a minute, this thing really is real. It can be addressed.”

**Underlying your proposals is the goal of environmental justice: creating a city where under-resourced neighborhoods no longer bear the brunt of climate impacts. However, economic inequality is pretty well entrenched in most cities in the world. Doesn’t it seem likely that the privileged will continue to hoard resources and not share them with those less fortunate?**

The answer is yes, of course. You can’t outlaw greed. But, if you live in a building that produces its own food, harvests its own water, and generates its own energy, there is a minimum good standard of living. That is a city that starts out by design to exclude poverty. If every building is designed to be independent of every other building, that’s the beauty of being off the food grid and off the water grid and off the energy grid. If you can create an environment that allows that to happen, you’ve got yourself a hardwood forest of buildings. They refer to New York City as a forest of skyscrapers. Wouldn’t it be ironic, eventually, if it were a forest of wooden skyscrapers?

**Your book features satellite photos of large cities at night. The pictures in the book made me think of the scene from the movie “The Matrix,” in**

**which Agent Smith, who's basically a piece of machine code, describes human beings as a virus and a plague, noting that other mammals are able to live in balance with their surrounding environment while mankind seems unable to do that. As someone whose academic career was built on the study of parasites, what do you think of this idea?**

Cities to the planet are parasitic. It seems to me that we are genetically programmed—like honeybees are genetically programmed, like ants and termites are genetically programmed—to construct houses that reflect our wants and needs. And humans, once they discovered the virtue of the city, the first thing that popped into their mind was, I can get rich. I can exploit a collection of people to allow me to accumulate their wealth. If you look at virtually every city, you'll see what the center of the city is all about. It's about wealth. And it's about commerce. And it's about the accumulation of wealth, not just by individuals but also by cities. I mean, a city can become wealthy also. And it can share that wealth. And people living in that city can benefit from that. That's the way we're programmed.

My biggest gripe about urbanization is it's essentially unplanned except for one thing: commerce. That's planned. Poverty is a design issue. It's a failure to accommodate everybody. By design, cities should include every single individual who lives there. What I would like is the framework of the city at least, to reflect a respect for both the city and the natural environment. The real undercurrent of this is that, if you don't think integrating human activities with a compatible, natural landscape is important, just keep doing what you're doing. You'll see the result. You'll find out what the natural world actually does for you. But it'll be too late. It'll be gone. And when that happens, we will be gone. ♦